

# Focus *on* NIF

*The National Ignition Facility, a stadium-size, 192-beam laser, is an essential tool for maintaining the safety and reliability of our nuclear weapons, harnessing fusion energy for future generations, and understanding conditions that exist in stars.*

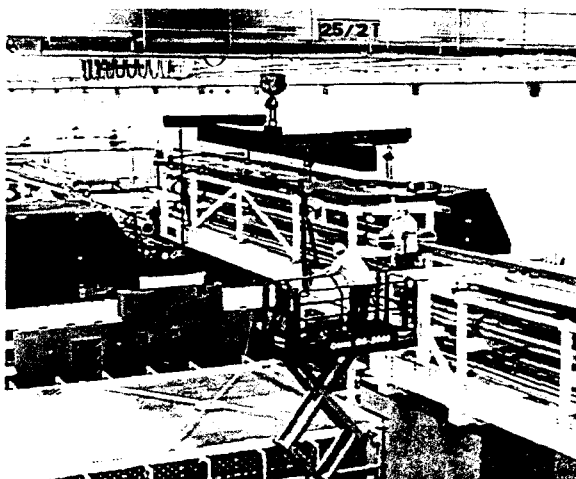
## Overall Assessment

As of the end of August, the National Ignition Facility (NIF) is satisfactorily meeting its technical performance, cost and schedule milestones.

Hensel Phelps Construction Company (HPCC) turned over the Laser Building to the Beampath Infrastructure System (BIS) Commissioning and Operations team for beneficial occupancy.

## Technical Status

- Crystal boule processing room, located at Cleveland Crystals, Inc. (CCI of Highland Heights, OH), is ready to begin rough fabrication of crystals: machine tools, supplies and equipment are in place, including the finishing machine shipped from LLNL to CCI. Crystals serve two purposes in NIF. They function as optical switches, in the plasma electrode Pockels cell, allowing NIF's laser beams to be directed for multiple passes through the amplifiers in order to make the laser beams



Jacobs ironworkers install a utility spine section in Laser Bay 2.

—photo by Bryan Quintard

more powerful. They also convert the laser light from its principal infrared wavelength to green light and then to ultraviolet light ( $3\omega$ ), the latter being much more effective at driving the inertial confinement fusion reactions that are the goal of NIF.

- **Jacobs** (Pasadena, CA) set the spine prefabricated sections for Laser Bay 2 utilities and bolted the sections into place on concrete pedestals (see photo, bottom left). The utilities spine runs down the center of each laser bay and supplies air, tempered water, argon and nitrogen gases to the infrastructure equipment. These utility spines are prefabricated by **Kinetics Systems** (Union City, CA) in eleven units. The Kinetics Systems' fabrication is the first major utilities subcontract awarded by Jacobs Engineering.
- **Contra Costa Electric, Inc.** (Martinez, CA) mobilized to start installing electrical utilities, racks and cables for the master oscillator and control rooms – in the central area of the laser building. These will be used during the initial commissioning phases of the Injection Laser System.
- **Spectra-Physics Lasers, Inc.** (Mountain View, CA) completed four Laser Mirror 4 optics (20 inches by 24.4 inches, three-inches thick and weighing 130 lb) coating, measuring and sending them to NIF for cleaning and installation into the line replaceable unit hardware. These mirrors are the most challenging of all the transport mirrors because they are exposed to the most laser light per square centimeter and because they require the thickest coating to meet reflectivity specifications.
- Received this year's delivery of Russian  $3\omega$ -fiber for laser power sensors. This fiber transmits light signals from the target area to the power sensor chassis. The contract was initiated as part of a U.S. program to employ former USSR defense laboratories.

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No U.S. companies expressed interest in manufacturing this fiber due to its unique requirements and limited quantities.

- Bought the first unit of the Diagnostic Instrument Manipulator (DIM), a 6.2 meter (20.33 feet) long, 1 meter (3.28 feet) diameter, two-stage telescoping manipulator that can position a package of up to 130 kilograms (286 pounds) to the target chamber center. DIM will accurately position a variety of diagnostic packages between the NIF target chamber wall and the target, without breaking chamber vacuum. A small technical crew will assemble, calibrate and prepare the DIM for installation.
- Updated the Mitigation Action Plan which manages the environmental impacts of constructing and operating NIF. Updated twice a year, this plan includes items such as pollution prevention measures and recycling at the construction site to minimize waste.

## Recent Meetings, Reviews, Reports, Visits

### Meetings

**August 23, 2001,** The Department of Energy Director of the Office of NIF, Jim Anderson, and his staff member, Paul Ross, inspected NIF after attending the NIF Monthly Status Review.

**August 29, 2001,** Four members of the Foster Panel, supporting staff, and representatives from the National Nuclear Security Administration (NNSA), Los Alamos National Laboratory and Sandia National Laboratory were briefed on the utility of NIF's role in the Stockpile Stewardship Program and toured NIF. Officially named the Panel to Assess the Reliability, Safety and Security of the United States Nuclear Stockpile, the Foster Panel was created by an Act of Congress in FY99. It is chartered to examine the annual certification process for the nuclear stockpile and to review the adequacy of the science-based tools developed by the DOE/NNSA for future weapon certification actions.

## Profile of a NIF Industrial Partner

### GTC Manufactures Frame Assembly Units, Seal Plates & Valves

Established in 1947, **General Tool Company** (GTC of Cincinnati, OH) is one of the largest job shops in the country. GTC manufactures small, intricate items, as well as welding and machining components that measure up to 12' x 33'. This extensive experience and broad capability made GTC a perfect match when the National Ignition Facility (NIF) needed three special items manufactured: 195 frame assembly units, 247 amplifier seal plates, and 25 switchyard gate valves.

The aluminum switchyard gate valves measure 16-foot-high, four-feet-wide and 10-inches deep. The "gate valves," similar to vertically-opening windows, separate the roving mirror diagnostics enclosure from the switchyard beam enclosures. This barrier allows personnel to work on the delicate robotics of the roving mirror assembly and separate themselves from the argon gas in the switchyard beam tubes. The argon gas can be retained in the switchyard beam tubes and flushed out of the roving mirror diagnostics enclosure where personnel need to work.

GTC has used an advanced welding technique called friction stir welding to manufacture the FAU side panels. This method yields a product that is cleaner, costs less to manufacture, and results in less material being wasted during the manufacturing process. Often, the items that GTC manufactures are custom designed. With the new friction stir welding technology as part of their repertoire, GTC has won a new contract to design, build and install friction stir welding machines that will weld 27.5 diameter by 8-foot, 15-foot, and 20-foot-long barrel sections of the 157-foot-long space shuttle external tank.

GTC's website is [www.gentool.com](http://www.gentool.com)